This thickness of ice is equal in weight to about 1600 feet of rock, while the greatest known elevation since the removal of the load is not much more than 700 feet, implying that a weight of 900 feet of rock can be supported by the shield. It may be, however, that in the interior of Labrador, where no beach-lines give evidence as to changes of level, the doming is much greater than the amount suggested.

It is of interest to note that these adjustments to change of load take thousands of years to accomplish. The rise due to the melting of the Labrador ice-sheet may be going on slowly now, 30,000 or 40,000 years after the load was lifted.

These sinkings and risings must be accomplished by plastic flow outwards from beneath the loaded area or inward toward the area relieved of its load.

Instead of a rigid, unyielding shield, we must conceive a stiffly flexible covering over a plastic substratum, where during thousands of years adjustments of level, amounting to hundreds of feet, may take place; and during millions of years of removal of load by erosion, or of piling on of load through sedimentation, changes of level of thousands of feet can be accomplished. Such changes have taken place on the southern and western sides of the shield without any known rupture, while on the east the adjustment has been accomplished in part by great faults.

Has the Archæan, which is supposed to underlie the stratified rocks in all parts of the world, undergone the same vicissitudes?

Summary.

The history of the Canadian Shield begins in pre-Keewatin times, with land surfaces on which weathering took place, and seas in which mud and sand were deposited. If the earth were ever molten, that stage had long been passed before the Keewatin sediments were laid down, for they include carbon, probably derived from fucoids, which could not have lived in a hot sea.

The pre-Keewatin land surfaces and sea bottoms have totally disappeared, so far as known to Canadian geology. Apparently they have been fused and transformed into the gneisses of the Laurentian.

The Keewatin was a time of great volcanic activity, lava streams and ash rocks surpassing in amount the thick sheets of sediments. At the end of the Keewatin the thousands of feet of volcanic and clastic rocks were lifted as domes by the up-welling of batholiths of early Laurentian gneiss.

Then followed a profound gap in the record, during which the mountains were levelled to a hummocky peneplain. This gap represents a very long period of weathering and destruction on a land surface, ending in glacial action on a large scale.

The Lower Huronian begins with the deposit of a thick and widespread Boulder Clay, followed up by a transgression of the sea in which mud and sand, and also limestone and chert, were deposited.

After a short break similar processes went on in the Middle Huronian. During the Middle Huronian, or in the interval between it and the Upper Huronian (Animikie), mountain-building was renewed on a grand scale, many synclines of Keewatin and Lower Huronian rocks being caught between the rising batholiths of late Laurentian gneiss. A broad central band of the Lower Huronian escaped this process, however, and has preserved its original attitude on a floor of Keewatin and Laurentian.

The Animikie or Upper Huronian sediments which rest on the planed-down floor of upturned Lower Huronian, Laurentian, and Keewatin rocks, consist largely of chert and carbonaceous slate or shale, which lie nearly horizontal and have undergone very little change.

The Keweenawan follows the Animikie with only a small break, and includes shallow water-beds of sandstone and conglomerate, accompanied by immense outflows of lava. As a result of the outpouring of lava, great basins, like that of Superior, resulted. It is probable that during the Animikie and Keweenawan most or all of the Canadian Shield was covered by the sea.

The Keweenawan is generally held to mark the close of the Archæan (or Algonkian or Proterozoic). Low reports portions of these formations as having been caught in mountain-building of the Laurentian type in Labrador, but commonly they have not been disturbed.

During early Palæozoic times the Canadian Shield was more than once encroached upon by the sea, though probably much of the peninsula of Labrador, and perhaps a region north-west of Hudson Bay, escaped.

From the Devonian to the Pleistocene the shield seems to have remained dry land, and part of the Ordovician and Silurian capping of sediments was removed during this long period.

The succession of Pleistocene ice-sheets completed the work of denudation, and at the end of the Ice Age many thousands of square miles of the lower portions were once more beneath the sea.

Last of all, the region has been rising at unequal rates in different parts, as shown by the warping of marine and fresh-water beaches.

The surface of low hills and rounded knolls of gneiss and schists beneath the Pleistocene Boulder Clay resembles in every way that beneath the flat shales and limestones of the early Palæozoic, or the nearly horizontal sediments of the Animikie, or even the undisturbed parts of the Lower Huronian Boulder Clay. It may be that much of the surface has been covered with sediments and restored to daylight by subaërial erosion several times in succession. The greater part of the carving-down seems to have been done before the Animikie—*i.e.* within pre-Cambrian times —and the pre-Huronian surface seems as mature as any of the later ones. The bearing of this on the length of early geological time is evident. Pre-Huronian time includes the laying down of thousands of feet of Keewatin sediments, the elevation of early Laurentian mountains, and the levelling of these mountains to a peneplain. It may be as long as post-Huronian time.

NOTES.

PROF. F. W. DYSON, F.R.S., Astronomer Royal for Scotland, has been appointed Astronomer Royal in succession to Sir William Christie, K.C.B., F.R.S., who is to retire on October 1.

AT the age of seventy-eight years, and in his native place, Lunel, Eugène Rouché, the well-known mathematician, recently passed away. He entered the École Polytechnique in 1852, and on completing his course there devoted himself to teaching, in which he was very successful, and the composition of text-books, which quickly obtained a high and deserved reputation. The treatise on geometry which he wrote in partnership with Charles de Comberousse may be fairly called a classic, and is an excellent example of what such a work ought to be; many teachers in this country must have found it a most useful source to draw upon, both for theorems and for examples. Engrossed as he was by these occupations, Rouché found time to write a number of original notes and papers, and his talents received fitting recognition in 1896, when he was elected a free member of the French Academy of Sciences in succession to Baron Larrey. Friends who knew him intimately bear witness to his personal charm and vivacity, and the academy, on August 22, passed a vote of sympathy with his widow and family, after hearing a brief account of his career from the president, M. Emile Picard.

IN the death, in his seventy-seventh year, of Prof. Friedrich von Recklinghausen, of Strassburg, pathology loses one of its most distinguished investigators. Working along the lines marked out by Rokitansky and Virchow, v. Recklinghausen played a conspicuous part in building up our knowledge of pathological anatomy during the second half of the nineteenth century. His researches threw a great deal of light upon many aspects of disease of the circulatory system, especially the phenomena of thrombosis and embolism, well described in his great "Handbuch der allgemeinen Pathologie des Kreislaufs und der Ernährung," published in 1883. He devoted great attention to the study of "fibroid" tumours of the uterus and other pathological conditions of the female genital system, which formed the subject of another of his treatises. He also added greatly to our knowledge of general bone-diseases, such as rickets, osteomalacia, and acromegaly, and especially of the pathological changes in the form of the skull caused by rickets. His observations on the nature of a curious frog-like swelling under the tongue called "ranula," on hæmatogenous pigmentation of the skin, and on the heart condition he called "segmentatis myocardii," are well known; but perhaps his discovery of the association of multiple fibrous tumours of the skin with the distribution of cutaneous nerves is that most usually associated with his name as "Recklinghausen's disease."

MR. C. A. BRERETON, whose death, at the age of fifty-nine years, occurred on Monday last, was for many years associated with Sir John Wolfe Barry, K.C.B., F.R.S., in important engineering enterprises, such as the construction of the Barry Docks and railways, the Middlesbrough Docks, Surrey Commercial Docks, and the new bridge across the Thames at Kew. He also did a good deal of engineering work for the Caledonian, North-Eastern, Metropolitan, Metropolitan District, Whitechapel and Bow Railways, parts of the Great Northern and Piccadilly Tube, and for the Government of Natal. In recent years he was in business on his own account.

THE death is announced, in his fifty-ninth year, of Mr. William Earl Dodge Scott, curator of the department of ornithology at Princeton University. He was the author of "Bird Studies," "Story of a Bird Lover," "Birds of Patagonia," and many technical papers in scientific journals. Mr. Scott had done field work for the British Museum, the American Museum of Natural History, and other institutions.

DR. ROBERT AMORY, a well-known American writer on physiology and therapeutics, has died at his summer home at Nahant, Mass. He was born in 1842, graduated in medicine at Harvard in 1866, and was appointed in 1869 lecturer at Harvard on the physiological action of drugs. He was afterwards professor of physiology at the medical school of Bowdoin College.

THE death is announced, at the age of seventy years, of Mr. John Langton, consulting surgeon to St. Bartholomew's Hospital, and a former Hunterian professor of pathology and surgery at the Royal College of Surgeons. In 1900 he was Bradshaw lecturer.

IN connection with the fourteenth Flemish Congress of Natural and Medical Science, an International Scientific Exhibition will be held in Antwerp on September 17–25 next. The exhibits are to be classified as under:—Section i., physico-chemical sciences: including new apparatus and inventions, laboratory installations, lanterns, microscopes, and the scientific applications of photography; collections of chemical productions, geological specimens, and crystals. Section ii., biological science: apparatus for experimental research and demonstration, zoological and botanical collections, fossils, microscopical preparations, and photomicrographs. Section iii., medical science: experimental apparatus, pathological specimens, radiograms, surgical instruments and appliances; operation-room, sanatorium, and hospital furniture; electro-medical and X-ray apparatus. Section iv., scientific books and reviews.

THE twenty-seventh convention of the Association of Official Agricultural Chemists is to be held at Washington on November 10–12, when communications on the following subjects are to be given:—Phosphoric acid; nitrogen; potash; soils; inorganic plant constituents; insecticides; water; food adulteration; dairy products; foods and feeding stuffs; sugar (chemical methods and molasses methods); tannin; drugs and medicinal plants.

AN International Congress of Tuberculosis is to take place in Rome on September 24–30 of next year. Prof. Guido Baccelli is to be the president, and Prof. v. Ascoli, of Rome, the general secretary.

THE statue (by Mr. Bruce-Joy) of Lord Kelvin which is to be erected in Belfast is, according to the *Westminster Gazette*, in an advanced stage of completion. Lord Kelvin is represented as holding in his right hand the design of a gyroscope, and by the side of the effigy is a model of the Kelvin compass. The statue is to be cast in bronze, and will stand on a pedestal 12 or 13 feet high.

A GRANITE obelisk erected in the parish churchyard of Forfar to the memory of George Don, the Scottish botanist, was unveiled last week by Mr. G. Claridge Druce, who gave an address on Don's achievements as a botanist.

ACCORDING to the *Lancet*, the remainder of her estate (in addition to a million francs already bequeathed) has been left to the Pasteur Institute in Paris by the widow of the Marquis de Beauregard de Maubreuil d'Orvault.

THE New York correspondent of the *Times*, writing on September 12, states that Prof. Macmillan, who accompanied Commander Peary on his last voyage, reports from Labrador that he has made a successful exploration of the region westward from Davis Inlet to George River and the home of the Nasquapee Indians. Three lakes, the largest of which, called Misternipi, was twenty-five miles wide, were discovered.

THE American Philosophical Society gives notice that in December next it will award its Magellanic gold medal "to the author of the best discovery, or most useful invention, relating to navigation, astronomy, or natural philosophy (mere natural history only excepted)." Candidates for the award, who may be of any nationality, must send their claims (in English, French, German, or Latin) to reach the society in Philadelphia by November 1, but the award will not be made for any communication already published or for which a prize has been given elsewhere. Each MS. must bear a motto, device, or other signature, the author sending the society a sealed letter giving his real name and address in addition to the motto, &c., upon his essay.

A REUTER message from Paris states that a private conference of the official delegates of the various Governments at the Pure Food Congress has arranged to make certain methods of analysis international, with the consequence that when any food is in future submitted to an analytical test it will have to conform to that international standard.

IN the June issue of the *Philippine Journal of Science* Messrs. R. B. Bean and F. S. Planta publish the third of their studies of Filipino racial types at Taytay, this portion of the memoir being devoted to women. In measurements of the body, the greatest differences appear between the Primitive and the Iberian types, the women approximating to the former and the men to the latter. Between these comes the Australoid type, which in the crural index resembles the Negrito. In head measurements, the women have relatively broader heads, faces, and noses than the men; in other words, they are more Primitive than the local men or the women of Siberia, with whom a useful comparison is made. We now possess some materials for disentangling the complex racial elements in the population of the archipelago. As is usual with the work of this school of anthropology, the memoir is provided with elaborate statistical summaries and excellent photographic illustrations.

IN our article on "Malaria Prophylaxis in India" (August 25), we remarked upon the somewhat discouraging fact that no instance of a drainage scheme with successful result was put before the recent Malaria Conference at Simla. Since then, however, we have received the report of an interesting lecture on the prevention of malaria by Dr. Malcolm Watson, of the Federated Malay States (Selangor). As is well known, Dr. Watson has long been conducting, with the assistance of the Government and Dr. Travers, the senior medical officer, an extensive campaign against malaria, principally by the method of drainage, and his lecture gives a brief but very interesting account of the work done. In two large stations, Klang and Port Swettenham, the disease has been almost entirely banished by drainage alone, with a saving of more than 400 lives per annum. As the case mortality of malaria is only about 1 per cent., this saving of mortality means an enormous saving in morbidity, which doubtless the inhabitants are able to appreciate. A similar improvement has been made in all the flat rural areas in the State, especially in many of the rubber plantations. Here the disease is carried by *Myzorhynchus umbrosus*, which does not breed easily in any running water; so that mere open surface drains suffice to banish the insect, especially when accompanied by removal of jungle. In the hilly land, however, *Nyssorhynchus willmori* appears to be the carrier—an insect which breeds readily in rapidly running streams—with the result that the ordinary drainage methods will probably be useless, closed pipe drains and other methods being required. Dr. Watson's energetic and long-continued campaign demonstrates not only the utility of drainage, which he maintains is the fundamental method against malaria, but also the fact that it must be intelligently carried out. It is probably neglect of this latter principle which has caused most of the reputed failures. Many other points are referred to in the lecture. For example, rice fields are found to be almost free from malaria, owing to the fact that, for some unexplained reason, the malaria-bearing species of Anopheline cannot thrive in their waters. Dr. Watson strongly emphasises the necessity for research on this point, and urges that a time may come when we may be able to deal with malaria at much less expense than by any method known at present—"we will be able to play with species of Anophelines, say to some 'go' and to others 'come,' and abolish malaria with great ease, perhaps hardly at any expense." We understand that a book by Dr. Malcolm Watson on "The Prevention of Malaria in the Federated Malay States" will shortly be published by Major Ross, with the aid of subscriptions from a number of rubber plantations collected for the purpose by Sir Frank Swettenham, the distinguished founder of the Federated Malay States. It seems a pity that Dr. Malcolm Watson was not invited to attend the malaria conference at Simla.

THE Proceedings of the Royal Physical Society of Edinburgh (vol. xviii., No. 2, July) contain an interesting note by Prof. Graham Kerr on the presence of a posterior vena cava in Polypterus. The author points out that this vein, which forms so characteristic a feature of the higher vertebrates, is made up of two elements, being formed anteriorly by the primitive hepatic vein and posteriorly by the hinder portion of the posterior cardinal (inter-renal). The manner in which this has come about is indicated by the condition of the lung-fishes, Lepidosiren and Protopterus, in which the posterior extremity of the liver has become fused with the anterior extremity of the right kidney, and a venous anastomis has been established between these two organs, the large hepatic vein forming a direct channel for the passage of blood from the right kidney to the heart. It is interesting to find in the ganoid Polypterus that, while the primitive hepatic vein is developed into a large posterior vena cava which joins the fused posterior cardinals posteriorly, the anterior ends of the posterior cardinals still persist in a well-developed condition, though much larger on the right side than on the left. Polypterus in this respect combines the condition met with in higher vertebrates with that which is characteristic of fishes generally.

ACCORDING to the report for 1909 and the first half of the current year, further particulars with regard to the movements of turbot and plaice have resulted from the investigations undertaken by the officials of the Northumberland Sea Fisheries Committee. A turbot, for instance, liberated at Skate Roads in August, 1907, was retaken nearly two years later about fifty miles from Aberdeen, while a plaice returned to the sea at the former locality in July, 1907, was recaptured in the following December near the Bell Rock. Experiments in artificially breeding lobsters have proved unsuccessful.

NO. 2 of the tenth volume of the *Museums Journal* is chiefly devoted to a report of the conference held at York in July last, when the president, Dr. T. Anderson, devoted his address to volcanoes and their treatment in museums. Photographs are regarded as the best means of illustrating volcanic phenomena in public exhibition, as models and sketches alike nearly always show an exaggeration of the vertical scale, while the first-named of these are costly.

IN the May issue of the Proceedings of the Philadelphia Academy Mr. T. Barbour relates the history of the discovery of the Chinese alligator, and the gradual acquisition of fuller knowledge of the species. It is stated that only a dozen specimens are known in collections, only one of which, and that recently acquired, is in America. The species appear to have a very limited distribution in the Yang-tse valley, most of the twelve specimens having been obtained near Wuhu and Chinkiang, although records exist to Poyang Lake and Nankin.

ZEBRAS and zebra-hybrids form the subject of an illustrated article by Dr. E. Trouessart in *La Nature* for August 27, in which reference is made to the proposal to regard the members of the *Equus burchelli* group as specifically inseparable from the quagga.

As an appendix to the description of a new species of Platysaurus, Mr. J. Hewitt furnishes, in the Annals of the Transvaal Museum for November, a useful key to the genera of South African lizards.

IT will be within the recollection of most botanists that Messrs. James Backhouse, of York, promoted a scheme in 1899 for the supply of botanical material to colleges and schools for demonstration and research, although recognising that for some time, at any rate, the venture would not be self-supporting. Subsequently the interests were transferred to the British Botanical Association, of which Dr. A. H. Burtt became the director. After ten years, notwithstanding the expansion of the original scheme and the increased demands due to the extension of nature-study, it has become apparent that the institution cannot exist as a private venture, and therefore it is proposed to enlist the help of individuals interested in the aims of the association and convert the undertaking into a public association of subscribers. This decision was formulated at a meeting of botanists and others, and an executive committee was elected to proceed with the enrolment of members and associates. As the institution exists purely for the preferment of botanical study and research, it is to be hoped that sufficient subscribers will be forthcoming to ensure its permanence.

THE seventh part of the *Prodromus Florae Britannicae*, an elaborate and critical revision of the British flora that is being prepared by Mr. F. N. Williams, has now been published by C. Stutter, 110 High Street, Brentford, and the author announces that the next part will conclude the Sympetalæ and the first volume. The present part enumerates thirty-five genera, beginning with Plantago and ending with Vaccinium, but the sequence of families is unusual. Two species new for Britain are recorded under Plantago, while five species only are admitted under Mentha, as the author follows the views elaborated by Malinvard, that several species generally accepted are merely hybrids. Among the numerous interesting notes attention is directed to the remarks on the oxlip, the occurrence of two blue pimpernels, and the use of the word "anthemia" for the whole mass of flower clusters of *Stachys arvensis*.

A NOTE on the protection of timber against white ants appears in the Transactions of the Royal Scottish Arboricultural Society (vol. xxiii., part ii.). Three processes are described, of which one is a contrivance for destroying white ants by pumping a poisonous smoke through their galleries, while the others are timber-treatment measures. Details of the Powell process are not disclosed, but "blue oil" is the specific which apparently has received recognition at the War Office.

DR. SVEN HEDIN contributes a short paper to the July number of *Petermann's Mitteilungen* in which he summarises the scientific results of his journey in Tibet during the years 1906–8. Preliminary notes on the meteorological observations and the geological collections are added by Dr. Nils Ekholm and Dr. Anders Hennig. The Swedish Government has voted a sum of 75,000 kroner, to be paid in equal instalments in 1911, 1912, and 1913, towards the cost of publication of the detailed reports, which are to consist of three volumes of memoirs and an atlas in two volumes. The text, which will extend to about 1500 pages, will consist of reports on geographical discoveries and observations, memoirs on the physical geography of Tibet, and special papers by Dr. Ekholm on meteorology and hypsometry, Dr. Olsson on astronomical observations, Dr. Hennig on geology, and Prof. Lagerheim, Dr. Ostenfeld, and others on botany. A map of Tibet on a scale of 1 : 1,000,000 will appear in 1912.

THE last number of the *Sitzungsberichte* of the Bavarian Academy of Sciences contains a communication from Prof. A. Rothpletz on the cause of the Californian earthquake of 1906, in which he points out that the triangulation of the central area of the region affected by the earthquake shows that it has undergone an extension amounting to about 1 in 30,000. This expansion may be explained by one of three hypotheses:—(1) as the result of the relief of tangential pressure in the earth's crust; (2) by a transference of heat and change in position of the isogeotherms; or (3) by magmatic intrusion; the first two being excluded as not fully accounting for the observed displacements, the third is accepted. The earthquake is, therefore, regarded as belonging to the class called cryptovolcanic by Prof. Hörnes, which Prof. Rothpletz prefers to call "injection" earthquakes; and as the San Francisco earthquake is considered to be due to movement along the San Andreas fault, indirectly caused by deep-seated intrusions, it becomes an injection-fissure earthquake.

THE eleventh "Review of Mining Operation in the State of South Australia," for the half-year ending December, 1909 (Adelaide, 1910, 26 pages, 3 plates), reports that the mining industry was hampered by the strikes at Broken Hill and of the New South Wales colliers, and by the low price of copper, the most important mineral in South Australia. Further progress is reported in boring for coal in the Permo-Carboniferous rocks of the Northern Territory, but only three inch seams of inferior coal were found during the six months reported. The most novel mine in South Australia is that being opened in the Carnotite lode, near Olary, and the report includes a short account of the mining operations in progress, and an analysis of the ore made under the direction of Prof. Dunstan. The ore is to be worked for radium. An attempt is being made to supply the tube mills at Broken Hill with flints from the local beaches. The flints now used are sent from Europe, and are said to come from Iceland, but as they are shipped to Australia as ballast, they have hitherto held the market against the local supply.

IN vol. vii., No. 1, of the fifteenth series of the Palæontologia Indica (Mem. Geol. Surv. India), Mr. F. R. C. Reed describes and illustrates a series of Cambrian fossils obtained by an officer of the Indian Survey from the Bhabeh rocks of Spiti, which, from the evidence of very scant remains, were provisionally assigned by the late Dr. Stoliczka to the Lower Silurian. A large proportion of the fossils consists of trilobites, none of which, so far as the condition of the specimens admits of forming an opinion, can be identified with European or American types; consequently, a number of new names appear in the memoir.

THE Rev. Dr. A. Irving writes to say that the letters of Messrs. Deeley and Lamplugh on "Stagnant Glaciers" in NATURE of September 8 (p. 297) "seem to overlook the important causal factor of solar radiation in connection with the question," and directs attention to an article of his, entitled "Solar Radiation and Glacier Motion," in NATURE, vol. xxvii., April 12, 1883, in which a series of laboratory experiments on the subject, with deductions, is given. The article in question was supplementary to a paper by the author on the mechanics of glaciers, which appeared in the Quarterly Journal of the Geological Society for February, 1883.

WE have received the report of the Hydrographer on Admiralty Surveys for the year 1909. The report shows that during the year extensive revisions of the charts of home waters were made by four vessels, the largest areas sounded being off the west coast of Scotland. Very important additions to our knowledge of British Columbian waters were made by H.M.S. *Egeria*, the increase in size and number of ships using the Edye, Beaver, and Schooner passages making the surveys of these channels specially valuable. H.M.S. *Mutine* carried out a number of important lines of soundings off the west coast of Africa, and in Australian waters H.M.S. *Fantôme* laid a line between Thursday Island and Cartier Island, the latter being formally annexed by Captain Pasco on March 17.

THE connection between non-periodical variations of rainfall and famines in German East Africa is discussed by Dr. E. Kremer in No. 1, year 1910, of *Aus dem Archiv der Deutschen Seewarte.* Normal annual rainfall values can only be safely calculated from thirty to forty years' observations, and monthly values require a much longer period. These are not available for the district in question; the author directs attention to the fact, but he makes the best possible use of the short series at his disposal and of the information obtainable from travels and expeditions. The German colony extends from latitude 1°–12° S., and longitude 29°–40½° E., and the rainfall may be divided generally into one rainy period in the south and two rainy periods in the north. The greater part of the country has less than 40 inches of rain per annum; only the central and northern coastal districts and the mountainous parts receive more, while the whole of the interior tableland, to about longitude 33°, receives less than 30 inches. The author discusses the possibility of predicting famines or scarcity on the lines successfully followed in India, and shows, *e.g.*, that scanty rainfall, or its unfavourable distribution, in Zanzibar is followed by famine over a large part of the East African coast, and further that the distribution of atmospheric pressure in the months preceding the rainy periods is intimately connected with the amount of subsequent rainfall.

THE Royal Meteorological Institute of the Netherlands has issued a paper, by Dr. P. H. Gallé, in which a large number of wind and current observations, chiefly from the Indian Ocean, are examined with the special purpose of testing the theories of Nansen and Ekman with regard to the effect of the deflecting force of the earth's rotation in changing the direction of drift currents and to the speed of current set up by wind action. Dr. Gallé finds that when the drift influence is alone at work in producing surface current, the angle between the wind and the resulting current is between 40° and 50°, substantially in agreement with the theoretical values. A wind velocity of 1 metre per second produces an average speed of current of between 4 and 5 centimetres per second.

MR. H. T. FERRAR contributes an interesting paper on "The Creation of an Artificial Water-table in Egypt" to the July number of the Cairo *Scientific Journal.* The author is of opinion that the modern irrigation constructions in themselves have had little direct effect in raising the level of the subsoil water in the Nile delta, but he deals specially with the changes induced in the irrigation system of Lower Egypt by the works of Mohammed Ali Pasha, who in 1820 excavated a number of deep perennial canals capable of discharging the low-level summer supply of the Nile. Observations made at more than one hundred and fifty experimental tube wells support the view that there are two water tables in Lower Egypt: (1) a natural water-table, which is independent of the works of man except locally where extra permeability allows a constant supply of irrigation water to be added; and (2) an artificial water-table which was created by the act of the introduction of perennial irrigation by Mohammed Ali Pasha. It is thought that the artificial water-table (2) has gradually become higher, owing mainly to excessive watering of crops, until at the present day it has a deleterious effect upon the fertility of the soil. Mr. A. Lucas offers some criticism of Mr. Ferrar's conclusions in the August number of the same journal.

The *Journal de Physique* for September contains the full text of a communication made to the French Physical Society in March last by M. C. Féry, describing a spectrograph with a prism having spherical faces so designed that the image of the slit is in focus on the photographic plate. Both faces of the prism are concave to the incident light, and the back surface is silvered so as to reflect the light. The slit, the centres of curvature of the two faces, and the spectrum produced are on a circle which has the radius of the first surface of the prism for diameter. With a prism of quartz a metre from the slit and screen, the spectrum photograph obtained is 22 centimetres long, and the definition is very good throughout. Like the Rowland concave grating, the apparatus is astigmatic.

A NEW form of colorimeter has been sent for our inspection by Messrs. E. B. Atkinson and Co., Hull. The liquid to be tested is placed in a rectangular glass cell of a few cubic centimetres capacity, by the side of which works a vertical hollow glass wedge filled with a standard coloured solution. By means of a screw the wedge is raised or lowered, thus bringing various thicknesses of the standard colour into the same field of view as the cell. Both liquids are viewed horizontally through a slit against a white background, and the position of the wedge is adjusted until a depth of tint is found equal to that of the liquid under examination. A graduated scale shows how much the wedge has been raised, and by reference to a chart the corresponding proportion of colouring ingredient in the liquid is obtained. Wedges calibrated for certain purposes—*e.g.*, the colorimetric determination of iron, copper, ammonia, hæmoglobin, iodine—are supplied by the makers; but the user can himself readily calibrate the instrument for his own particular purposes. For example, a medical man could with little trouble construct a standard hæmoglobin chart for his own district. Other advantages claimed for this "universal" colorimeter are (1) saving of time, a reading requiring only about a minute; (2) exactness, since the two colour surfaces compared are contiguous; and (3) economy of cost. The apparatus appears to be especially suitable for operations involving a number of colorimetric estimations of the same type.

THE fifteenth number (No. 3 of 1910) of the Italian review *Scientia*, now in its fourth year, is largely occupied with philosophy. The ideas of Poincaré, Bergson, Einstein, and the Pragmatists naturally form the text of discussions, such as that by F. Severi on "Hypothesis and Reality in Geometrical Science," or Chwolson's "Can we apply Physical Laws to the whole Universe?" or F. Enriques's criticism of Pragmatism. The theory of two star-streams interpenetrating one another is described by Mr. A. S. Eddington, of the Royal Observatory, Greenwich. M. Guignebert sketches the rise of Christianity in accordance with the sifted conclusions of recent research. Mr. Abegg's article on "Chemical Affinity" has a pathetic interest, from the fact that while it was in the press the author met his death in an aëronautic accident. The useful *rassegne* of various sciences are continued; Mr. E. S. Russell reviews the claims of epigenesis *versus* evolution. The advantages of a "mnemonic" theory of heredity, in accordance with the suggestions of Semon, Rignano, and Francis Darwin, involving an "interiorisation of external stimuli," is well put. M. Landry supplies his annual review of economic research. M. le Comte de Baillehache defends his system of electric units—a dimensional system—put forward last year in his "Unités électriques." Reviews of scientific periodicals, notes of scientific meetings, and critical notices of books, make up an issue that is very level in quality. The books reviewed

are worth noting, viz. E. Borel, "Elements de la Théorie des probabilités"; Marcel Landrieu, "Lamarck, le fondateur du transformisme"; Georges Bohn, "La naissance de l'intelligence"; Georges Dwelshauvers, "La synthèse mentale"; W. Lexis, "Theorie der Bevölkerungs und Moralstatistik"; A. Solmi, "Storia del diritto italiano"; H. Bouasse, "Bachot et bachotage."

We welcome the first annual number of the Journal of the Bedales School Scientific Society. This society has been in existence for some years, holding meetings of the kind familiar in schools; and its members have also been engaged on pieces of experimental work, some touching the edge of new inquiry. This year the society prints accounts of certain members' work, as well as reports of the meetings, and the Journal shows that at Bedales science is at once a favoured pursuit in free time, and a well-treated part of the curriculum. The subject-matter is limited to physics and chemistry; next year, perhaps, biological notes might be included—Hampshire is an interesting county—and short articles as well as longer papers may suitably find a place in such a periodical. Of the papers, that by D. Jarintzoff on the rare earths is worthy of mention, as a painstaking attempt to grapple with the separation of metals of the cerium group, and shows careful reading as well as experimenting. A paper on coherer-action shows resource and ingenuity; the writer is rash, perhaps, in criticising a paper by Robinson, whose work was watched by Drude himself. A word of praise is due to the society's committee for the careful preparation of the Journal.

The Thermal Syndicate, Ltd., of Wallsend-on-Tyne, has sent us a reproduction of a photograph of the remains of their exhibit of "Vitreosil" laboratory apparatus at the Brussels Exhibition, from which it is evident that the fused silica ware successfully resisted the great heat to which the pieces had been subjected; some of the larger pieces had, however, been broken by the falling of heavy girders.

The ninth volume of the *Journal of Experimental Zoology* is, according to *Science*, to be a memorial to Prof. W. N. Brooks, prepared by his former students at Johns Hopkins University, and will be issued in four parts towards the end of the present year. It will contain a biographical sketch by Prof. H. V. Wilson, accompanied by three portraits in heliotype.

A useful list of binoculars and telescopes has reached us from Messrs. F. Darton and Co., 142 St. John Street, E.C., copies of which may be obtained from the address given.

OUR ASTRONOMICAL COLUMN.

Metcalf's Comet, 1910*b*.—No. 4440 of the *Astronomische Nachrichten* contains new elements and a daily ephemeris for Metcalf's comet. The elements were calculated by Dr. Kobold from places observed on August 11, 17, and 25, and give the time of perihelion as August 26·04673 (M.T. Berlin). The following is an extract from the ephemeris:—

Ephemeris for 12h. (M.T. Berlin).

1910	α (1910·0)	δ (1910·0)	log *r*	log Δ	Mag.
	h. m.	° ′			
Sept. 14	15 30·4	+17 13·9	0·2862	0·3442	11·4
,, 18	15 29·2	+17 22·8	0·2877	0·3578	11·5
,, 22	15 28·4	+17 31·8	0·2895	0·3701	11·5
,, 26	15 27·9	+17 41·4	0·2916	0·3815	11·6
,, 30	15 27·8	+17 51·7	0·2939	0·3919	11·7

From this we see that the comet is now apparently nearly stationary about half-way between τ' and ι Serpentis. A note from Prof. Pickering states that when discovered, visually, by the Rev. J. H. Metcalf on August 8, the comet was of about the eighth magnitude.

A Suspected New Planet.—On examining a plate taken for Halley's comet on June 6, Prof. J. Comas Sola found the trace of an unknown, but undoubtedly real, object, which he suspects to be a tenth-magnitude minor planet. During an exposure of one hour the motion was apparently nearly due N. and S., making an angle of about 50° with the ecliptic; the following approximate position depends upon the position of the nucleus of Halley's comes according to Prof. Seagrave's ephemeris:—1910 June 6, 9h. 20m. (G.M.T.), R.A. = 10h. 13m. 22s., N.P.D. = 90° 40·5′; the motion in N.P.D. was of the order of +45′ *per diem* (*Astronomische Nachrichten*, No. 4440).

Definitive Elements for Comet 1852 IV.—A comprehensive discussion of the orbit of the comet discovered by Westphal, at Göttingen, on July 24, 1852, is published by Herr Adolf Hnatek in Nos. 4438–9 of the *Astronomische Nachrichten* (pp. 345–87). The final result confirms the period of sixty-one years, the actual value being 61·5554 years, and this comet should return in 1913.

A Suggested Volcanic Origin of Martian Features.—The theory that the various features and variations on the surface of Mars may be due to volcanic action is advocated by Dr. Wilhelm Krebs in No. 4439 of the *Astronomische Nachrichten*. During the opposition of 1909 various new features were observed, and these are held to indicate volcanic action, while the network of "canals" is compared with the network of seismic and volcanic tectonic lines met with in the earth's crust.

The Passage of the Earth through the Tail of the 1861 Comet.—In the September number of the *Bulletin de la Société astronomique de France*, M. R. Baer, of Rouen, describes the phenomena observed by him at Horbourg (Alsace) at the time of the earth's passage through the tail of comet 1861 II. He points out that the vertical pillar of light then seen by him at the northern horizon was analogous to that described by recent observers as being visible during the predicted passage of the earth through the tail of Halley's comet.

The Spectrum of Cyanogen.—No. 6, vol. xxxix., of the *Memorie di Astrofisica ed Astronomia* contains a note in which Comte de Gramont and M. Drecq discuss some results recently obtained by them during a research on the spectra of various mixtures of salts. They find evidence that the chief "cyanogen" band (3883·6) may be produced under conditions where the presence of the cyanogen compound is unlikely, carbon and nitrogen being present, however. Thus they suggest that the function of cyanogen may be simply to supply carbon and nitrogen, and that the appearance of this band does not necessarily imply the presence of the poisonous compound. Further, they point out that if this result be established, the passage of the earth through the tail of a comet such as Halley's, in the spectrum of which the band at 388 was prominent, becomes still less likely to produce any evil effects.

Researches on the Colours of Stars.—Employing the *réseau* method devised by M. Henry, M. Östen Bergstrand examined the spectra of a number of stars to compare the effective wave-lengths radiated by different spectral types and by different classes of coloured stars. The results are published in vol. ii. (series iv.), No. 4, of the Proceedings of the Royal Society of Sciences of Upsala, and embody several important conclusions. Among other things, M. Bergstrand finds that the stars may be sharply divided into white and yellow, with a marked discontinuity between the colour classes G.W.+ and W.G.−. For the white stars, the effective wave-length is, in the mean, about 420 μμ, and for the yellow stars it ranges from about 435 to 450 μμ; the corresponding spectral classes are B and A and K and M respectively. The effective radiation of pronounced red stars is about 460 to 470 μμ. The intermediate classes, G.W.+ and W.G.− of the Photometric Durchmusterung of MM. Müller and Kempf, and the spectral classes F and G of Prof. Pickering, are relatively rare. It is also pointed out that as the effective